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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,331	09/30/2003	Chirag S. Patel	YOR920030139US1	4661

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EXAMINER	
CHU, CHRIS C	

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 01/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H-A

Office Action Summary	Application No.	Applicant(s)	
	10/674,331	PATEL, CHIRAG S.	
	Examiner	Art Unit	
	Chris C. Chu	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 45* is/are pending in the application.

4a) Of the above claim(s) *1 – 25, 37 – 38 and 43 – 45* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *26, 27 and 29 - 34* is/are rejected.

7)☒ Claim(s) *28, 35 and 39 -42* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 September 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/30/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group II and Species (i) in the reply filed on November 8, 2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement between method and product, the election of Group II has been treated as an election without traverse (MPEP § 818.03(a)).

However, applicant argues "the original method claims 26 – 36 are generic to all of the species." This is not persuasive because claims 26 – 36 are drawn to Species I because claim 26 cites "removing portions of said die under said trench so as separate a portion of said die on one side of said trench from a portion on another side of said trench." Thus, claims 26 – 36 are not generic claims.

Furthermore, applicant argues "the newly added claims 39 – 45 includes linking claims 43 and 44 between elected method claims 26 – 36 and original method claims 37 and 38." This is not found persuasive because between distinct species, a "linking" claim must be a generic claim. Claims 43 and 44 are not generic and thus not linking. Therefore, claims 43 and 44 are not linked to claims 37 and 38.

Even further, applicant argues "claim 45 is believed to be generic to various species." This argument is not persuasive because the elected species I, (Figs. 1 – 2Q) does not show a stacked device. Thus, claim 45 is not a generic claim nor species I claim.

Applicant elected the species of Figs. 1 – 2Q (i.e., claim 26) and thus claim 26 along with claims 27 – 36 and 39 – 42 are herein examined. Claims 1 – 25, 37 – 38 and 43 – 45 are withdrawn. The requirement is still deemed proper and is therefore made FINAL.

Drawings

2. The drawings are objected to as failing to comply with:

(a) 37 CFR 1.84(p)(5) because they include the following reference characters not mentioned in the description: the reference numbers "36" in Fig. 2F, "48" in Fig. 2P and "90" in Fig. 7A are not disclosed in the specification of the instant invention.

(b) 37 CFR 1.84(p)(5) because they do not include the following reference sign mentioned in the description: the reference numbers "72" mentioned on page 19, line 28 and "143" mentioned on page 24, line 11 of the specification does not show in the figures.

(c) 37 CFR 1.84(p)(4) because reference characters "144" and "148" in Figs. 11A and 11B have both been used to designate the micro-cups.

(d) Figs. 11A and 11B are not consist each other (i.e., the shape of the reference number 140 and/or the location of the reference number 142).

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures

appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 26, 27, 29, 30, 33 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Richards et al. (U. S. Pat. No. 5,904,496).

Regarding claim 26, Richards et al. discloses in e.g., Figs. 17 – 22(b) and column 8, lines 53 – 63 a method for forming a semiconductor die (column 6, lines 50 – 54), comprising:

- forming a trench (303; column 7, lines 52 – 60) in a surface of said die (column 6, lines 60 – 65);
- filing the trench with a sacrificial material (the patterned mask layer in the pattern plating process; column 8, lines 59 – 63. Furthermore, since the pattern plating process uses a patterned mask layer before plating the conductive layer and removes the patterned mask layer after the conductive

layer is placed, the patterned mask/resist layer read as the sacrificial material. See Richards et al., U.S. Pat. No. 6,121,119; column 8, lines 33 – 42);

- patterning said die to form a series of channels extending substantially perpendicularly to said trench (the channels that formed in the patterned mask layer to form the element 305 in Fig. 19 and Fig. 22b);
- depositing a conductive material (305; column 8, lines 53 – 63) in said channels;
- removing at least a portion of the sacrificial material (removing the patterned mask layer after the conductive layer 305 is placed); and
- removing portions of said die under said trench so as to separate a portion of said die on one side of said trench from a portion on another side of said trench (see column 16, lines 53 – 64 and Fig. 21).

Regarding claim 27, Richards et al. discloses in e.g., Figs. 17 – 22(b) and column 8, lines 53 – 63 further comprising: patterning said sacrificial material so that said channels extend so as to be partially in a portion of said die and partially a portion of said sacrificial material.

Regarding claim 29, Richards et al. discloses in e.g., Figs. 17 – 22(b) and column 8, lines 53 – 63 said removing being performed by grinding or etching of said die (column 16, lines 53 – 60).

Regarding claim 30, Richards et al. discloses in e.g., Figs. 17 – 22(b) and column 8, lines 53 – 63 said die being part of a wafer (300) having a plurality of dies, and said trench is a dicing lane (311) of said wafer (column 6, lines 50 – 54).

Regarding claim 33, Richards et al. discloses in e.g., Figs. 17 – 22(b) said conductive material is one of a metal (column 8, lines 64 – 67).

Regarding claim 34, Richards et al. discloses in e.g., Figs. 17 – 22(b) further comprising depositing an adhesion layer (a thin barrier layer; column 9, lines 1 – 9) in said channels prior to depositing said conductive material.

5. Claim 36 is rejected under 35 U.S.C. 102(b) as being anticipated by Igel et al. (U. S. Pat. No. 6,127,274).

Igel et al. discloses in e.g., Figs. 1 – 3 a method for forming a semiconductor die (1; column 4, line 51), comprising:

- forming a trench (4; column 4, lines 56 – 57) in a surface of said die (1; column 4, line 51);
- filing the trench with a sacrificial material (5; column 4, line 58);
- patterning said die to form a series of channels (6) extending "substantially" perpendicularly to said trench (see Fig. 2);
- depositing a conductive material (7; column 5, lines 6 – 9) in said channels;
- removing portions of said die under said trench(see column 5, lines 10 – 23 and Fig. 3); and
- removing at least a portion of the sacrificial material (5) so as to separate a portion of said die on one side of said trench from a portion on another side of said trench (column 5, lines 15 – 18).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a). A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al. in view of Trapp et al. (U. S. Pat. No. 6,451,705).

Regarding claims 31 and 32, while Richards et al. teaches the use of the sacrificial material (patterned mask layer), Richards et al. does not appear to provide the sacrificial material's specific composition to be a polymer (claim 31) or to be a photoresist (claim 32). Trapp et al. teaches in column 4, lines 32 – 35 a sacrificial material (patterned mask layer) being formed by polymer (column 4, line 35) or photoresist (column 4, lines 49 – 56). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the polymer or photoresist as the specific material to form the sacrificial material in the trench of Richards et al. as taught by Trapp et al. to provide a desired contact pattern using conventional photolithographic techniques as known in the art (column 4, lines 53 – 56).

Allowable Subject Matter

8. Claims 28, 35 and 39 – 42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

(a) Claim 28 contains allowable subject matter because none of references of record teach or suggest, either singularly or in combination, at least the limitation of a sacrificial material being patterned to a depth greater than the height of a die.

(b) Claim 35 contains allowable subject matter because none of references of record teach or suggest, either singularly or in combination, at least the limitation of an adhesive layer, as defined in the claim 34, being formed of a polymer and a silicon oxide.

(c) Claim 39 contains allowable subject matter because none of references of record teach or suggest, either singularly or in combination, at least the limitation of a conductive material, as defined in the claim 26, forming a plurality of conductive pins extending from a semiconductor die in a direction parallel to a plane of the semiconductor die.

(d) Since claims 40 – 42 are dependent claims of objected claim (claim 39), these claims are objected to as being dependent upon a rejected base claim (claim 26), but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (e.g., claim 39).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Dranchak et al., Eldridge et al., Sato, Malloy et al., Duinkerken et al., Zomorrodi et al., Siniaguine, Takiar et al., and Beyne et al. disclose a semiconductor device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 517-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

c.c.
Tuesday, January 18, 2005

GEORGE ECKERT
PRIMARY EXAMINER